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MEDIA RELEASE

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UM BIOCHEMIST RECEIVES $226,000 IN RESEARCH FUNDS FROM NATIONAL INSTITUTES OF HEALTH

MISSOULA --

University of Montana chemistry professor Walter Hill has just received $226,000 to continue studying some of life's most closely-held secrets. The three-year grant comes from the National Institutes of Health (NIH), a federal agency which, along with the National Science Foundation (NSF), has funneled over 1.5 million dollars into Hill's research during his career at the University of Montana.

What is Hill studying that warrants such support? His research centers on ribosomes, the tiny, double-bodied homes to strings of ribonucleic acid (RNA) and proteins. The ribosomes take genetic blueprints from the deoxyribose nucleic acid (DNA, the substance of genes) and manufacture proteins for the body according to their directions. But how the ribosomes make that transition from communicating to manufacturing is still a mystery. Unlocking that mystery holds implications for major breakthroughs in diagnostic medicine, cancer research and immunology.

Hill and his fellow scientists and researchers know the secrets to the communication and manufacturing processes lie in the way that ribosomes bond with various kinds of RNA. He

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explains that some RNA contains all the genetic information cells need to function. DNA initially transfers this information to RNA, which in turn takes it to the ribosome where the message is decoded and protein is made.

It's something like using different languages and alphabets, Hill says. Messenger-RNA (the main communicator of the genetic message), and DNA have only four letters in a particular "biological alphabet" to use. But the proteins, which are the ultimate product, contain as many as 20 letters (amino acids) in what is essentially a different biological language. The ribosome serves as the translation device.

But in human biology, of course, glitches in translation can and do occur. For example, Hill knows that the way bonding occurs between the RNA and ribosomes in a person who is ill may not be the same as the bonding in a healthy individual. And he knows that deliberate intervention in this bonding process has already provided massive medical benefits to mankind in the form of antibiotics, which work at the bonding sites themselves.

These bonding sites or "nests," within the ribosomes serve as bonding locations for various kinds of RNA. Antibiotics interfere in the nests, stopping the ribosomes from working, and effectively canceling cell growth, slowing or halting the course of an infection. Because interfering with bonding can cancel cell growth, Hill says the implications for finding a cure for cancer are also strong.

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Hill and his research team know they can prevent protein manufacture entirely in a laboratory simulation. For example, they can synthesize small pieces of DNA in their lab at the university and cover a loop or "nest" site on one of the ribosome's sub-units with these DNA strings. The DNA cover prevents the loop, which is looking for its answering site on the other part of the ribosome, from finding its match and joining with it. Removing the DNA pieces leaves the loop clear once again; the two halves of the ribosome bond through the loop and the ribosome is again functional.

A different protein-RNA link recently made national headlines when scientists at Children's Hospital in Boston and Harvard Medical School reported the discovery of the gene responsible for Duchenne muscular dystrophy, a progressive disease that destroys muscle tissue.

The culprit gene serves as the blueprint for the manufacture of a specific protein in muscle tissue. When that protein is missing or altered, Duchenne muscular dystrophy results. The scientists found that the gene produced messenger-RNA that would direct the formation of the protein chain. The garbled genetic code inserted a faulty amino acid into the protein chain, causing the protein to either not be created at all or to be altered.

Hill has been fascinated with ribosomes since his graduate student days at the University of Wisconsin-Madison. In addition to the funding he has received from NIH and NSF, he has also received NIH pre-doctoral and post-doctoral fellowships as well as an NIH Research Career Development Award.

Hill collaborates with scientists world-wide in the course of his research. In September he traveled to the Soviet Union at the invitation of the Soviet Academy of Sciences to present his work. He also collaborates with scientists at the University of Texas, Yale and UCLA as well as scientists in Moscow and Berlin.

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